

Trend Study 27-1-03

Study site name: Proctor Canyon.

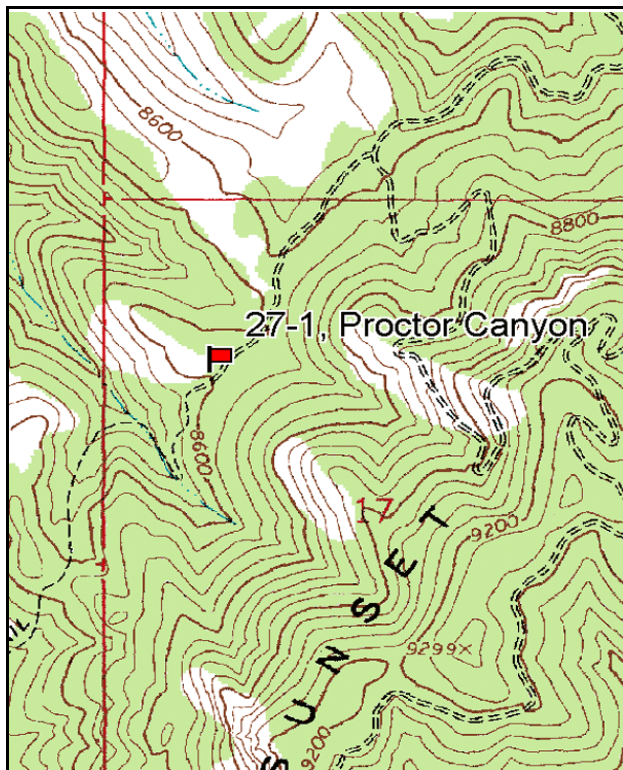
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 297 degrees magnetic.

Frequency belt placement: line 1 (11 & 71ft), line 2 (95ft), line 3 (59ft), line 4 (34ft). No rebar.

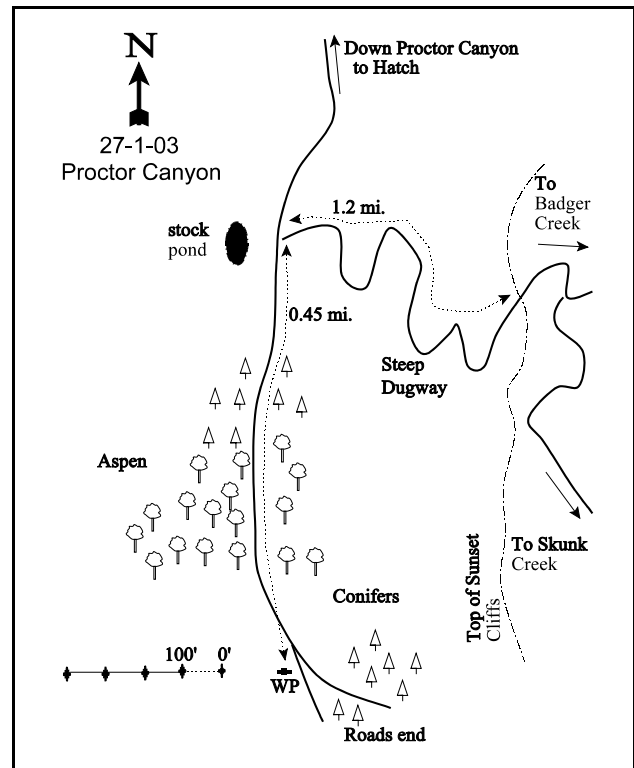
LOCATION DESCRIPTION

At the south end of Tropic Reservoir, turn west off the East Fork Sevier Road and proceed up Badger Creek 2.45 miles. Keep left at the fork and continue towards Proctor Canyon 3.5 miles to a fork at the top of the mountain. Go right towards Hatch for 1.2 miles, down a narrow, rocky dugway, to a fork in the aspens. Turn hard left towards Big Hollow/Camp Eli, and go 0.45 miles to a clearing and the witness post. The frequency baseline starts near the top of the hill and runs west-northwest. The trend study is marked by 2 foot tall green fence posts. The 0-foot baseline stake is 50 west of the witness post and is marked with a red browse tag #7161.



Map Name: Tropic Reservoir

Township 37S, Range 4 1/2W, Section 17



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4161084 N, 380141 E

DISCUSSION

Proctor Canyon - Trend Study No. 27-1

This study is located on big game summer range on the west side of the Paunsaugunt Plateau below the Sunset Cliffs. The small open ridge top where the study is located is a mixed mountain brush community surrounded by dense conifer forest and aspen stands. It is representative of larger, but more inaccessible, open, sagebrush ridges to the northwest. Elevation of the site is approximately 8,600 feet with a northwest aspect and slope that varies from 1-3%. One-half mile to the north, in the same cattle allotment, is a seeded area and stock pond. Deer sign, consisting of pellet groups and antler drops, was noted in 1992, along with a few elk pellet groups. Quadrat frequency of deer pellet groups increased by nearly 2-fold in 1997, while elk pellet group frequency remained at similar but low levels. Recent livestock use was also noted in 1997. Pellet group transect data from 2003 estimated 49 deer, 2 elk, and 8 cow days use/acre (121 ddu/ha, 5 edu/ha, and 20 cdu/ha) on the site.

The soil on the ridge is fairly deep with an effective rooting depth estimated at 14 inches. It is a light colored loamy sand with a neutral pH (7.1). Phosphorus may be limiting to plant growth at only 8 ppm, where 10 ppm is considered the minimum necessary for normal plant growth and development. Percent organic matter is also relatively low at 1.5%. Vegetation cover is good on the site, confining erosion to the bare interspaces. Bare ground has been moderate in all readings ranging from 17-23%. The road and steeper side hills show evidence of gullying and other surface erosion features. An erosion condition class assessment rated soils as stable in 2003.

The browse composition is diverse with 14 shrub species being sampled on the site. The most abundant key browse species are bitterbrush and black sagebrush which account for over ½ of the total browse cover. Serviceberry and currant are also prominent due to their larger size. At the edge of the aspen and conifer stands, young ponderosa pine and Rocky Mountain juniper are abundant. Of the 14 browse species encountered on the transect, serviceberry and bitterbrush provide the bulk of the forage utilized by big game. Both bitterbrush and serviceberry have been moderate to heavily hedged in all readings, with black sagebrush showing moderate to heavy use in 1987 only. In 1987 and 1992, the serviceberry population consisted of a high proportion of plants having poor vigor at 43% and 94% respectively. The shrubs were apparently suffering from Cedar-apple rust. During the 1997 and 2003 surveys, serviceberry vigor was normal on most plants. Bitterbrush and black sagebrush have maintained normal vigor in all readings. Serviceberry and black sagebrush have had moderate to high recruitment by young plants in all surveys. Bitterbrush recruitment was moderately high in 1987 and 1992, fair in 1997, and low in 2003. All 3 of these key species have had low decadence rates in all surveys, except for black sagebrush in 1987 when decadence was estimated at 36%. Serviceberry and bitterbrush leaders had averaged 3.6 and 2.5 inches of annual growth respectively when the site was read in mid-July of 2003.

It appears that during the 1987 reading there was trouble identifying the different rabbitbrush species. In 1992, the majority of the rabbitbrush was classified as stickleaf low rabbitbrush (*Chrysothamnus viscidiflorus viscidiflorus*) and dwarf rabbitbrush (*Chrysothamnus depressus*), with lesser amounts of Parry rabbitbrush (*Chrysothamnus parryi attenuatus*). These 3 species combined for an estimated density of 8,520 plants/acre in 1992, 59% of which was stickleaf low rabbitbrush. In 1997, all of the rabbitbrush species showed population declines. In 2003, dwarf rabbitbrush had a 64% density increase with Parry and low rabbitbrush's slightly increasing.

Complementing the diverse shrub overstory is a wide variety of herbaceous species. Eleven perennial grass species have been sampled on the transect with the most common being Kentucky bluegrass, mutton bluegrass, prairie junegrass, Letterman needlegrass, needle-and-thread grass, and slender wheatgrass. Total

grass production was poor in 1997 and 2003 with average cover values of only 8% and 9% respectively. Total grass cover was much higher in 1992 at nearly 19%. Nearly 50 species of forbs have been sampled at least once on the transect. Redroot eriogonum, dusty penstemon, Pacific aster, cinquefoil, and skyrocket gilia seem to be the preferred forb species. Although highly diverse, most of the forb species are infrequent. Grasses accounted for 30% of the total vegetation cover on the site in 1992, but only about 15% in 1997 and 2003. Average forb cover has steadily declined with each sampling as well.

1992 TREND ASSESSMENT

Percent cover of bare ground has increased slightly (17% to 20%) while litter cover declined by 37% (65% to 41%). Several open sandy areas on the site show that erosion is occurring, as do a few active gullies nearby. Some soil pedestalling is also evident. Overall, erosion is not a major problem on the site with trend for soil being slightly down. Heavy utilization of the key browse species has declined significantly since 1987. Vigor is good on all species except serviceberry which is suffering from Cedar-apple rust. Percent decadence of black sagebrush has declined to 11%. Age class analysis indicates that the key species serviceberry, black sagebrush, and bitterbrush have healthy populations. The abundance of the less desirable dwarf, Parry, and stickyleaf low rabbitbrush is a concern on this site. Continued increases in these shrubs could come at the expense of the more desirable shrub species. Overall, the browse trend is slightly up. Trend for the herbaceous understory is stable with a slight increase in the sum of nested frequency of grasses and a slight decrease in the sum of nested frequency of forbs.

TREND ASSESSMENT

soil - slightly down (2)

browse - slightly up (4)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

Percent bare ground has steadily increased on this site since 1987. Currently, nearly 22% of the ground surface is exposed and erosion is occurring in localized areas. Litter cover has increased since 1992 but vegetative cover has declined from 63% to 53%. More importantly from a watershed standpoint, sum of nested frequency for grasses and forbs has declined by 22%. Trend for soil is considered slightly down. Trend for the key browse species, serviceberry, black sagebrush and bitterbrush is also slightly down. Utilization is similar to 1992 with moderate to heavy use on serviceberry and bitterbrush, and mostly light use on black sagebrush. Density of serviceberry has declined by 52% since 1992. The number of mature plants increased slightly while the proportion of young plants declined from 62% to 17%. Black sagebrush declined 16% in population density since 1992 with a similar decline in young plants and an increase in percent decadence. Bitterbrush density has declined 51% since 1992 and young plants dropped from 740 plants/acre to 140 by 1997. Percent decadence is still low however, and the current number of seedlings and young appear to be adequate to maintain the population. On the beneficial side, the combined density of the less desirable dwarf, Parry and stickyleaf low rabbitbrush declined from 8,520 plants/acre in 1992 to 4,720 in 1997. Age class analysis of these species indicates mostly mature populations with few seedlings or young. Trend for the herbaceous understory is slightly down with the sum of nested frequency of grasses and forbs both declining. Average cover of grasses has declined from almost 19% in 1992 to only about 8% in 1997. Forb cover has also declined considerably (11% to 6%). Composition of the grasses is also changing on the site. Needle-and-thread grass along with Kentucky bluegrass have increased significantly in nested frequency since 1992. Currently, these 2 species account for 65% of the total grass cover. Slender wheatgrass, Prairie Junegrass, and Letterman needlegrass have all declined significantly. Common forb species on the site including thistle, Pacific aster, redroot eriogonum, longleaf phlox, and silverweed cinquefoil, are all weedy increasers.

TREND ASSESSMENT

soil - slightly down (2)

browse - slightly down (2)

herbaceous understory - slightly down (2)

2003 TREND ASSESSMENT

Trend for soil is stable. Bare soil continues to slightly increase, but the combination of vegetation and litter cover remain stable since 1997. Signs of erosion are minimal and soils were rated stable from an erosion condition class assessment done in 2003. Trend for browse is stable. The key species have low decadence, generally good vigor, and stable (serviceberry) or increasing (black sagebrush and bitterbrush) population densities. Recruitment was stable for serviceberry and increased in the black sagebrush population.

Bitterbrush had lower recruitment in 2003, and both serviceberry and bitterbrush displayed heavier hedging compared to 1997. Dwarf rabbitbrush increased by nearly 3-fold in total density, but the other 2 rabbitbrush species remained stable. Trend for the herbaceous understory is down. Sum of nested frequency values of perennial grasses and forbs show large declines since 1997. Drier conditions since 1997, coupled with the high canopy cover of browse species are negatively effecting the herbaceous component. This site should be considered for treatment in the near future. A decline in browse cover would favor herbaceous species and be beneficial in this area as shrubs are of less importance on this summer range.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down (1)

HERBACEOUS TRENDS --
Management unit 27 , Study no: 1

T y p e	Species	Nested Frequency				Average Cover %		
		'87	'92	'97	'03	'92	'97	'03
G	Agropyron spicatum	_{ab} 6	_b 25	_b 27	_a -	.16	.07	-
G	Agropyron trachycaulum	_c 185	_b 112	_a 40	_a 49	1.71	.13	.62
G	Bouteloua gracilis	_b 34	_a 15	_{ab} 13	_a 3	.36	.15	.03
G	Bromus anomalus	_a 8	_b 39	_a 1	_a -	.75	.00	.00
G	Carex spp.	_c 64	_b 24	_{ab} 11	_a 6	.87	.10	.09
G	Koeleria cristata	_a 54	_b 144	_a 78	_a 72	2.99	.61	1.11
G	Poa fendleriana	_b 88	_b 78	_a 45	_b 72	2.52	.54	1.14
G	Poa pratensis	_a -	_b 39	_c 101	_b 39	2.99	2.25	1.68
G	Stipa columbiana	_a -	_{ab} 1	_b 14	_{ab} 8	.03	.08	.04
G	Stipa comata	_a 17	_b 96	_b 124	_b 97	3.22	3.13	3.26
G	Stipa lettermani	_b 133	_{ab} 115	_a 83	_a 91	2.85	1.20	1.12
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		589	688	537	437	18.50	8.28	9.11
Total for Grasses		589	688	537	437	18.50	8.28	9.11
F	Achillea millefolium	_b 74	_{ab} 40	_b 55	_a 20	.82	.58	.07
F	Agoseris glauca	-	-	-	5	-	-	.04
F	Alyssum alyssoides (a)	-	-	-	6	-	-	.01
F	Antennaria rosea	-	3	3	-	.15	.15	-
F	Androsace septentrionalis (a)	-	8	2	5	.02	.00	.03
F	Arabis spp.	-	1	2	-	.00	.00	-
F	Artemisia dracunculus	_b 40	_b 33	_{ab} 23	_a 4	1.12	.66	.09
F	Artemisia ludoviciana	_b 15	_{ab} 7	_{ab} 6	_a -	.06	.06	-
F	Aster chilensis	_c 95	_{bc} 64	_b 43	_a 13	.67	.21	.04
F	Astragalus humistratus	_{ab} 16	_b 29	_b 28	_a 1	.42	.22	.00
F	Astragalus tenellus	_b 27	_a 5	_a 8	_a 3	.06	.01	.04
F	Aster spp.	-	-	-	3	-	-	.03
F	Castilleja linariaefolia	-	2	11	3	.00	.05	.01
F	Calochortus nuttallii	-	7	4	8	.01	.01	.04
F	Chaenactis douglasii	7	1	-	-	.00	-	-
F	Chenopodium fremontii (a)	-	-	1	-	-	.00	-
F	Chenopodium leptophyllum(a)	-	-	3	1	-	.00	.00
F	Cirsium arizonicum	_b 37	_b 40	_{ab} 35	_a 11	1.17	.43	.08
F	Collinsia parviflora (a)	-	_a -	_a -	_b 11	-	-	.02
F	Crepis acuminata	-	-	2	3	-	.00	.06

T y p e	Species	Nested Frequency				Average Cover %		
		'87	'92	'97	'03	'92	'97	'03
F	Cruciferae	5	-	-	-	-	-	-
F	Erigeron eatonii	a ⁻	a ⁻	b ¹¹	ab ¹	-	.12	.00
F	Erigeron flagellaris	c ¹⁴⁸	b ⁶³	a ⁶	a ¹⁰	.52	.01	.05
F	Erigeron pumilus	1	5	10	12	.15	.03	.13
F	Eriogonum racemosum	36	44	48	34	1.02	.34	.37
F	Eriogonum umbellatum	23	44	28	28	1.06	1.16	.57
F	Fritillaria atropurpurea	-	-	4	-	-	.01	-
F	Gayophytum ramosissimum(a)	-	-	3	11	-	.00	.05
F	Hymenoxys richardsonii	b ¹³	b ²¹	a ⁻	b ¹⁰	.23	-	.22
F	Ipomopsis aggregata	ab ⁶	bc ¹⁵	c ⁶	a ⁻	.08	.01	-
F	Linum lewisii	4	20	18	-	.26	.05	-
F	Lotus utahensis	4	-	-	-	-	-	-
F	Lychnis drummondii	-	10	1	6	.02	.00	.01
F	Machaeranthera canescens	12	16	13	22	.06	.12	.28
F	Microsteris gracilis (a)	-	-	-	8	-	-	.04
F	Oenothera caespitosa	-	2	-	-	.03	-	-
F	Oenothera pallida	-	3	-	11	.00	-	.19
F	Orthocarpus luteus (a)	a ⁶	b ⁵⁶	a ¹³	b ⁴⁵	1.53	.16	.41
F	Penstemon comarrhenus	b ⁵⁰	ab ⁴¹	a ³⁷	a ²⁴	.15	.21	.13
F	Penstemon humilis	-	-	-	3	-	-	.00
F	Phlox longifolia	ab ³⁷	c ⁶⁵	bc ⁵⁶	a ¹⁷	.45	.27	.04
F	Potentilla concinna	b ⁶⁵	a ²³	a ³⁰	a ²⁴	.87	.65	.46
F	Polygonum douglasii (a)	-	b ⁷⁸	b ⁵⁸	a ²	.28	.12	.01
F	Senecio douglasii	6	-	-	-	-	-	-
F	Taraxacum officinale	b ⁴²	a ¹	a ⁴	a ⁻	.00	.01	-
F	Tragopogon dubius	c ³¹	bc ¹⁵	ab ⁹	a ⁻	.08	.02	-
Total for Annual Forbs		6	142	80	89	1.84	0.30	0.60
Total for Perennial Forbs		794	620	501	276	9.54	5.46	3.00
Total for Forbs		800	762	581	365	11.38	5.77	3.60

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 27 , Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'92	'97	'03	'92	'97	'03
B	Amelanchier utahensis	22	21	16	3.45	2.30	4.71
B	Artemisia nova	33	28	44	4.94	5.62	7.39
B	Chrysothamnus depressus	22	14	26	1.22	1.36	1.04
B	Chrysothamnus parryi attenuatus	11	8	6	.24	.01	.04
B	Chrysothamnus viscidiflorus viscidiflorus	73	60	67	4.99	4.16	5.74
B	Gutierrezia sarothrae	10	3	2	.33	.03	.03
B	Juniperus scopulorum	0	0	0	4.28	3.40	2.78
B	Mahonia repens	1	1	0	-	.00	-
B	Opuntia spp.	3	0	0	-	-	-
B	Pinus ponderosa	1	1	0	.00	-	-
B	Purshia tridentata	60	52	53	22.88	22.12	19.85
B	Ribes cereum inebrians	6	3	4	1.74	1.78	1.86
B	Rosa woodsii	14	10	11	.85	.78	.45
B	Symphoricarpos oreophilus	21	18	27	2.37	3.02	3.40
B	Tetradymia canescens	26	17	25	1.06	.21	.69
Total for Browse		303	236	281	48.40	44.83	48.04

CANOPY COVER, LINE INTERCEPT --

Management unit 27 , Study no: 1

Species	Percent Cover
	'03
Amelanchier utahensis	3.84
Artemisia nova	6.15
Chrysothamnus depressus	1.61
Chrysothamnus parryi attenuatus	.23
Chrysothamnus viscidiflorus viscidiflorus	5.26
Juniperus scopulorum	7.59
Purshia tridentata	25.61
Ribes cereum inebrians	1.39
Rosa woodsii	.66
Symphoricarpos oreophilus	4.25
Tetradymia canescens	1.16

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 27 , Study no: 1

Species	Average leader growth (in)
	'03
Amelanchier utahensis	3.6
Purshia tridentata	2.5

BASIC COVER --

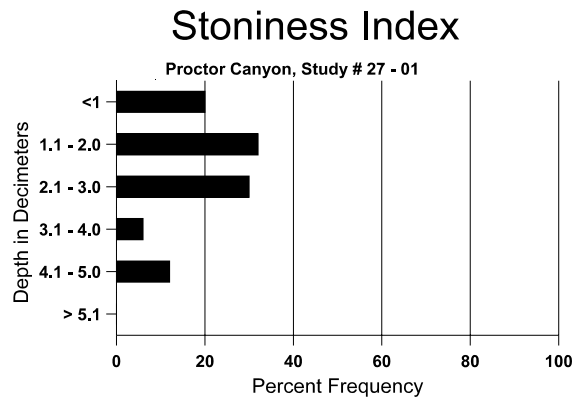
Management unit 27 , Study no: 1

Cover Type	Average Cover %			
	'87	'92	'97	'03
Vegetation	11.00	63.12	53.09	57.47
Rock	2.25	2.82	.37	.77
Pavement	5.25	0	1.62	.67
Litter	64.50	40.95	50.03	48.00
Cryptogams	0	.16	.83	.42
Bare Ground	17.00	20.06	21.83	23.27

SOIL ANALYSIS DATA --

Management unit 27, Study no: 1, Study Name: Proctor Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	% sand	% silt	% clay	%OM	PPM P	PPM K	dS/m
14.4	63.0 (14.3)	7.1	80.0	7.1	12.9	1.5	8.0	54.4	0.4



PELLET GROUP DATA --

Management unit 27 , Study no: 1

Type	Quadrat Frequency			Days use per acre (ha)
	'92	'97	'03	
Rabbit	6	1	6	-
Elk	3	2	5	2 (5)
Deer	12	22	19	49 (121)
Cattle	-	2	4	8 (20)

BROWSE CHARACTERISTICS --

Management unit 27 , Study no: 1

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Amelanchier utahensis											
87	466	66	266	200	-	-	0	86	0	43	52/49
92	1000	-	620	280	100	-	66	8	10	94	-/-
97	480	-	80	400	-	-	58	8	0	0	44/41
03	440	-	60	320	60	-	23	32	14	5	42/40
Artemisia nova											
87	3532	-	466	1800	1266	-	38	45	36	4	14/19
92	1840	60	500	1140	200	-	12	3	11	0	-/-
97	1540	20	180	1020	340	140	10	0	22	6	14/27
03	2720	-	520	1940	260	60	10	0	10	.73	19/27
Chrysothamnus depressus											
87	133	-	-	133	-	-	50	50	0	0	4/7
92	2880	-	440	2440	-	-	0	0	0	1	-/-
97	900	-	100	780	20	-	0	7	2	2	4/12
03	2480	-	-	2480	-	-	6	15	0	0	4/9
Chrysothamnus parryi attenuatus											
87	3732	200	533	2666	533	-	14	2	14	0	17/16
92	580	-	180	400	-	-	0	3	0	0	-/-
97	320	-	140	180	-	-	0	0	0	0	12/7
03	420	-	-	420	-	-	0	0	0	0	6/8
Chrysothamnus viscidiflorus viscidiflorus											
87	0	-	-	-	-	-	0	0	0	0	-/-
92	5060	80	1760	2900	400	-	2	0	8	2	-/-
97	3500	-	100	3380	20	-	0	0	1	0	16/21
03	3640	-	-	3420	220	-	0	1	6	.54	14/17

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Gutierrezia sarothrae</i>											
87	333	-	-	333	-	-	0	0	-	0	7/6
92	580	-	60	520	-	-	0	0	-	0	-/-
97	200	-	-	200	-	-	0	0	-	0	7/3
03	100	-	80	20	-	-	0	0	-	0	9/5
<i>Mahonia repens</i>											
87	0	-	-	-	-	-	0	0	-	0	-/-
92	20	-	20	-	-	-	0	0	-	0	-/-
97	20	-	-	20	-	-	0	0	-	0	3/5
03	0	-	-	-	-	-	0	0	-	0	3/5
<i>Opuntia</i> spp.											
87	0	-	-	-	-	-	0	0	-	0	-/-
92	60	-	60	-	-	-	0	0	-	0	-/-
97	0	-	-	-	-	-	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	-	0	-/-
<i>Pinus ponderosa</i>											
87	0	-	-	-	-	-	0	0	-	0	-/-
92	20	-	20	-	-	-	100	0	-	0	-/-
97	20	-	20	-	-	-	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	-	0	-/-
<i>Purshia tridentata</i>											
87	2732	333	533	2133	66	-	24	68	2	0	22/35
92	3460	180	740	2600	120	-	50	31	3	0	-/-
97	1680	140	140	1460	80	20	54	33	5	1	27/56
03	2340	-	80	2160	100	20	9	80	4	0	24/48
<i>Ribes cereum inebrians</i>											
87	0	-	-	-	-	-	0	0	0	0	-/-
92	280	40	160	100	20	-	0	0	7	7	-/-
97	80	-	-	80	-	-	0	0	0	0	61/72
03	80	-	-	60	20	-	0	0	25	0	54/48
<i>Rosa woodsii</i>											
87	0	-	-	-	-	-	0	0	-	0	-/-
92	1880	-	1820	60	-	-	0	0	-	0	-/-
97	1200	60	580	620	-	-	0	0	-	0	14/15
03	1140	120	800	340	-	-	0	0	-	0	8/8

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Symphoricarpos oreophilus											
87	0	-	-	-	-	-	0	0	0	0	-/-
92	1260	-	740	500	20	-	2	0	2	2	-/-
97	480	-	80	380	20	-	8	0	4	4	17/42
03	1200	-	40	1140	20	-	2	10	2	2	14/20
Tetradymia canescens											
87	1266	200	400	866	-	-	37	16	0	0	9/10
92	820	-	460	300	60	-	0	0	7	0	-/-
97	400	-	40	300	60	-	0	0	15	0	15/14
03	940	-	160	720	60	-	0	0	6	0	12/12